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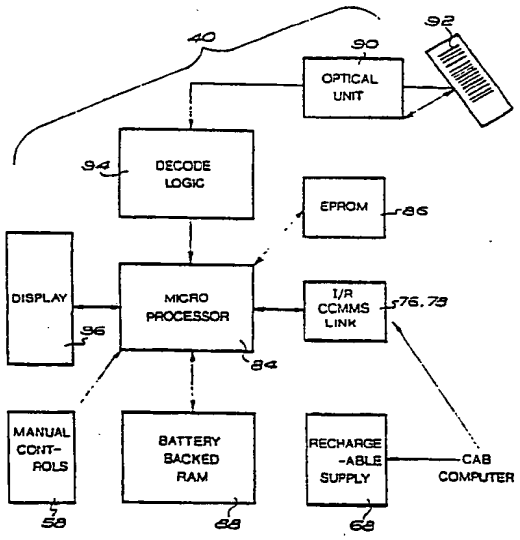
(57) Abstract

The invention provides for a data collection system, and specifically provides a means for the tracking of beer kegs by electronic means. Each beer keg is provided with a bar code, and the tracking system comprises a main frame computer which contains information representing all of the kegs and their locations e.g. at breweries or places of consumption and whether they are full or empty, a plurality of delivery vehicles for the kegs, each carrying its own computer, and the vehicle computers being adapted to receive in holders hand-held readers for reading the bar codes in the kegs. The readers can be detached from the holders so as to be used remotely from the cab computers, and the readers have electronic coupling devices so that when they are inserted in the holders, the read information can be downloaded from the holders into the cab computers in order to be processed. By the use of this system a track can be kept at all times on each and every keg which has its own unique code, and this leads to effective tracking of the kegs with the objective of eliminating steeling of such kegs. The invention has wider application than the tracking of kegs.



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Data Collection

This invention relates to electronic data collection, and is concerned particularly although not exclusively with portable data collection apparatus for use in the monitoring or tracking of coded articles such as beer kegs, gas cylinders or other re-usable articles having an intrinsic value. The invention has specific reference to the monitoring or tracking of coded beer kegs and reference will be made to such articles more specifically hereinafter, but it is to be pointed out that the specific form of the articles being monitored and tracked is not essential to the present invention.

The aluminium beer kegs which are used for containing beer are almost as valuable as the contents, and in fact there is a problem in connection with these kegs and that is they are frequently stolen for the intrinsic value of the metal. It is therefore desirable to keep a track on each keg as it moves in its useful life between brewery and public house, restaurant or other place of beer consumption, and the present invention at least in one aspect seeks to provide a system for the effective tracking of articles such as beer kegs by providing each article with a code and by using electronic reading means to read the code on the article and to provide for the processing of the electronic data representative of the article codes.

In a first aspect, the present invention takes account of the nature of the handling of articles such as beer kegs. Thus, the beer kegs are washed, cleaned and filled at the brewery, and they are then taken to the place of consumption. When the contents have been consumed, the kegs are brought back to the brewery for washing, cleaning and re-filling, and the kegs are once more put into circulation, although they may not return

to the same point of consumption. The handling of the kegs in this fashion requires the use of a transport vehicle, and the present invention at least in one aspect is designed to take account of the movement of the kegs.

According to the present invention, in a first aspect there is provided a system for monitoring or tracking coded articles which in use are moved from location to location, comprising:

a) a manned vehicle for moving the articles from location to location;

b) a data processor programmed to handle data representative of the codes of said articles, said processor being mounted on the vehicle so as to be accessible for manual operation;

c) at least one reader device holder associated with said processor;

d) at least one portable reader device by which the codes on said articles can be read, said reader device being usable remotely from the data processor so as to store data representative of said codes of said articles, and being adapted to be positioned in the holder; and

e) means coupling the reader device and said processor when the reader device is in the holder enabling the downloading of the data from the reader device to the processor.

In a second aspect of the invention, the invention provides a reader for use in a system as aforesaid, and in the second aspect, there is provided a reader device for use in a system for monitoring coded articles, said device being portable and comprising a reading head for reading codes on the articles, means for storing data representative of said codes, and a coupling head by which said stored data may be downloaded with a data

processor, said coupling head being spaced relative to the reading head.

By the provision of apparatus according to the invention for use in the first and second aspects of the invention as indicated above, certain other novel and advantageous aspects of the present invention result.

It is known to provide a data collection system for collecting data representative of bar codes. For example, in one known data collection system a portable optical bar code reader, (commonly known as a "wand"), can store successive items of bar code data, but it has no facility for processing such data. When the reader is full of data, or when it is required that the data in the wand is to be downloaded, the wand is placed into a well of an interface device, which is hard wired to a main computer station. The interface device receives the bar code data from the wand via an optical communications link, and transmits it as a continuous stream to the main computer. No data processing or mangement is done, except at the main computer station.

A disadvantage of this system is that the operator has to return to the main computer station in order to download the wand via the interface device, and the data cannot be processed until it enters the main computer. A particular shortcoming is that, when the wand is downloaded, the data is emitted in a continuous stream. If, for any reason, the communications link between the wand and the main computer has a fault, then all of the data from the wand can be lost. There is no means for buffering the data between the wand and the main computer.

The first aspect of the invention as indicated above is

distinguished from the said known system in that a vehicle mounted computer is provided and processing of the data or the capability of processing the data by the driver of the vehicle at any location where the articles are located is possible.

In another known system, a hand-held wand incorporates an optical bar code reader and a hand-held computer. An operator can scan bar codes using the wand and the wand has a visual display to provide prompts for the operator. A single hand-held unit can therefore collect the data and to a certain extent can enable the data to be logged and processed, but the system operates in that the data is transmitted to a main computer station via an interface device which receives the wand in a well, and data is transmitted to the interface device via an optical communications link. The data is then transmitted by hard wiring to the main computer station.

A disadvantage of this known system is that the wand can become full of data, and then an operator must return to the main computer station, in order to download the wand. Also, as with the other known system mentioned above, data is emitted in a constant stream via the interface device of limited intelligence, and data can be lost. Also the battery usage of the hand-held wand with its inbuilt computer is relatively high, and there is no facility for recharging the wand batteries when it is positioned in the interface device. By its very nature, the wand with built in keyboard, visual display, etc cannot be very rugged, and is inevitably susceptible to damage. Moreover, it will be appreciated that the wand also tends to be rather large.

The system of the invention according to the first

aspect mentioned above is distinguished over each of the known systems in providing a computer embodied in the mobile vehicle, but as indicated the present invention does have further reaching possibilities in relation to data collection systems and in various embodiments and aspects provides for the remote collection of data and subsequent transfer of the data to a main computer station in a secure manner. Moreover, the systems according to the aspects of the invention aim to provide remote collection devices which can operate indefinitely, without having to return to the main computer station. Specific aspects of the invention aim to provide a portable optical bar code reader which is of a rugged construction, and is suitable for use in relatively hostile environments. Also, particular aspects of the invention aim to provide data collection systems which are both simple and reliable to operate.

In addition to the first and second aspects of the invention mentioned above, certain additional inventive aspects are indicated below.

According to another aspect of the present invention, there is provided a data collection system comprising a hand-held data reader adapted to read and store successive items of data; and a portable data processor unit adapted to receive successive items of data from the data reader, process said items of data, and store said items of data on a portable data storage medium.

In a particularly advantageous arrangement, a portable data storage medium is provided and is in the form of a cartridge which contains an electrically erasable read-only memory (E^2ROM).

The said data collection system preferably includes a

computer adapted to receive said portable data storage medium, read said stored items of data thereon, and further process said items of data.

Preferably, said data reader is a self-contained, self-powered unit, and the system further includes a selectable communications link between the data reader and said data processor unit for the transmission of data therebetween.

Said data processor unit preferably includes an alpha numeric keyboard for the manual input of data and a visual display unit for displaying alpha numeric characters to an operator.

In an advantageous arrangement, the data reader has at least one visual display means which is operative to cycle between predetermined display states. The data reader may have no visual display means other than the or each aforesaid visual display means.

The data reader may have at least one manual control in response to which the data reader is operative to cycle between predetermined modes of operation. The data reader may have no manual control other than the or each aforesaid manual control. The data reader may have mode control via the optical unit in response to which the data reader is operative to cycle between predetermined modes of operation.

The data reader preferably has a processor which is operative to interact with said data processor unit to control the transmission of data therebetween.

Preferably, the data processor unit is operative to receive location data indicative of a present physical location of the unit, and to so process and store data

as to indicate a relationship between said location data and said successive items of data.

The data processor unit is preferably arranged to execute a program which may be read from said transportable data storage medium and subsequently stored in the data processor unit.

In a further aspect, the invention provides a hand-held data reader comprising a housing; data reading means mounted in the housing and adpated to read an external data medium; a non-volatile memory; a communications port adapted for the transmission of data from said memory to an external device; and data processing means adapted to receive data from the data reading means, transmit the data to said memory, and transmit data from said memory to said port; said housing being substantially fluid-tight.

The data reader preferably includes rechargeable power supply means contained within said housing.

Preferably, at least part of said housing is of a resilient shock absorbent material. The data reading means is preferably mounted, at least partially, in resilient, shock abosrbent material.

Preferably, said data processing means is arranged to execute a program which may be transmitted to the data reader via said communications port and subsequently stored in the data reader.

In yet a further aspect, the invention provides a data processing system comprising a computer and a plurality of data collection units remote from the computer, the computer being arranged to receive from the data collection units data indicative of the identity and

physical location of each of a plurality of articles, and to so process the data as to provide an indication of the present physical location of each of said articles, at any given time.

In one embodiment, said items may be beer kegs, each of which carries a unique identification bar code, and the system further includes means for reading said bar code and transmitting respective data to the data collection units.

For a better understanding of the invention in its various aspects, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:-

Figure 1 is a perspective view of a housing for holding a data processor unit in the cab of a delivery vehicle;

Figure 2 is a perspective view of the top of the data processor unit to be held in the housing of Figure 1;

Figure 3 is a side view of a portable reader of which two can be operatively coupled to the computer of Figure 2;

Figure 4 is a perspective view from the rear of the reader shown in Figure 3;

Figure 5 is a block schematic diagram of the reader of Figure 3;

Figure 6 is a block schematic diagram of the data processor unit of Figure 2; and

Figure 7 is a block schematic diagram of a data cartridge processor, and the link between the data

cartridge and a mainframe computer.

Referring to the drawings, and firstly to Figures 1 to 4, the housing shown in Figure 1 by reference numeral 10 is for mounting in a delivery vehicle cabin by means of a mounting bracket 12 which has fixing apertures 14 and fixing slots 16 for the reception of screws, the slots 16 enabling the housing 10 to be pivoted on the bracket 12 to the most suitable position for the operator. The housing 10 comprises a body 18 of the truncated shape shown in Figure 1, which is closed by means of a lid 20 which can be swung between the closed position shown in Figure 1 and an open position by being pivoted in a direction as indicated by arrow 22. The lid may be capable of being locked in the closed position if desired. The casing 10 and the bracket 12 will usually be of metallic material, but could be of other material such as plastics material if required.

Inside the body 18 is housed a data processing unit of which the upper surface is indicated in Figure 2. The unit is indicated by reference 24 and is provided with two wells 26 and 28 for receiving data readers as shown in Figures 3 and 4, and the computer is provided with a keyboard 30 by which data may be entered into the computer 24, and by which data in the computer 24 may be altered and processed. Reference numeral 32 indicates a visual display unit, whilst reference 34 indicates a printer to provide a print-out of data as required. The computer 24 is also adapted to receive a data containing cartridge 36, by which data may be inputted into the computer 24 for the programming of same, and in the alternative data in the computer 24 may be downloaded into the cartridge 36.

The vehicle in which the computer is mounted via the housing 10 and bracket 12 may typically be a beer

delivery vehicle or dray, the computer 24 being used for processing data in electronic form related to coding carried by beer kegs which are delivered and collection by the dray as it travels between the brewery where the kegs are washed, cleaned and filled, and beer consumption locations such as public houses, restaurants, sports clubs and the like.

As stated, the two wells 26 and 28 are for receiving data readers each as shown in Figures 3 and 4. The data reader shown in Figure 3 and Figure 4, comprises a body 40 which is made up of a pair of injection moulding casing parts 42 and 44 which are secured together by means of screws 46. The data reader is a hand-held portable component, and comprises a hand grip portion 48 and a nose portion 50. At the extremity of the hand grip portion 48 is a base block 52 of shock absorbent resilient material, such as a tough rubber, and at the end of the nose 50 is provided a similar shock absorbing buffer 54. From this buffer 54 projects a protruberance 56 which contains an optical reading head by which bar code information may be read from the individual beer kegs.

The reader is provided with a manually operable trigger 58 for the operation of the reader in the manner to be described. It will be understood that the user holds the reader by gripping the handle portion 48, and with the forefinger around the trigger 58, so that the reading protruberance 56 can be pointed at and easily swept over the bar code to be read. The reader is of robust construction in that the operative components are contained within the casing parts 42 and 44, and as the extremities of the casings are protected by the blocks and buffers 52 and 54 of shock absorbing material, so if the reader is dropped as it will be in view of the harsh environment in which it will be used,

it will be protected from damage. The casing parts 42 and 44 are also connected in a fluid type manner with each other and with the blocks 52 and 54 preventing the ingress of moisture into the interior of the reader thereby protecting the electronics contained therein.

To the rear spine of the reader is provided a window 56 through which various warning lights can be viewed in areas 58, 60, 62, 64 and 66 in the operation of the reader as will be explained herein.

Additionally, the reader contains rechargeable batteries 68 which are charged through contacts 70 and 72 which are exposed on the outside of the casing part 42, and which, when the reader is placed in a well 26 or 28 contacts power points in the wells 26 and 28 whereby the recharging power is derived from the computer 24. The electronic memory in the reader 40 is illustrated by reference 74 in Figure 3, and it will be seen that this is contained within the casing parts 42, 44 to be protected thereby.

Basically, the apparatus thus far described operates as follows. When a dray is loaded at the beginning of the working day with the appropriate full kegs of beer to be delivered, the delivery list and the codes of the kegs are contained electronically in the cartridge 36 and the driver picks up that cartridge and perhaps a print-out of what is contained in the cartridge before he commences his delivery. As he performs his delivery at each consumption location, he enters the location in the computer 24 using the keyboard 30 and then makes his delivery. For each keg which is delivered he takes a scan using the reader 40, perhaps at a location remote from the vehicle, and he can also by switching the reader to a collection mode as will be explained hereinafter, read the codes on the empty kegs which are

being returned from that particular location. All of the information which he has concerning delivery of the kegs and the return of empty kegs is now contained electronically in the reader 40. The reader is then placed in the well 26 or 28, and the information can be downloaded from the reader 40 into the computer 24 to enable the computer 24 to subtract the kegs delivered and add the kegs collected to provide a new set of data which will be capable of being downloaded at the brewery into a main frame computer as will be explained hereinafter. The manner by which the electronic information is downloaded from the reader 40 into the computer 24 is by means of an optical communications link, and the optical transmission is by infra red through transmission outlets/inlets 76, 78 as shown in Figure 4. These are located to the rear spine of the reader 40, but these and indeed the contacts 70 and 72 could be located at any convenient location to suit the construction of the computer 24.

As concerns the indication lights 58 to 66, these provide the following respective functions of the reader 40. When a user first operates the reader, he presses trigger 58 which causes area 60 to be illuminated indicating that the reader 40 is in delivery mode. For each successful read of a bar code on a keg which is delivered, area 58 is illuminated. Prolonged manipulation of the trigger 58 moves the reader into collect mode, which means illumination of area 64. Again for each successful read of a keg which has been collected, area 58 is illuminated. Area 60 is illuminated to indicate a failure, and area 66 is a remove mode indication, for example to indicate that information is being deleted when a mistake has been made.

Therefore by examination of the reader areas 58 to 66, an operator can see at a glance whether or not the

reader is operating satisfactorily.

It should be mentioned that each of the kegs is marked with a bar code containing an indication of the brewery, an indication of the keg number which is unique to the keg, and an indication of the keg type (there are various types of kegs). The bar code also includes a section which represents a check sum which is a portion to indicate whether or not the bar code is being read properly.

The system also includes a main frame computer at which all data concerning the data processors of all delivery vehicles is contained, so that the main computer can keep a track on all kegs which are in use as between brewery and use locations. The main frame computer can be arranged to provide information indicative of mistakes i.e. kegs being in locations where they should not be, and possible sources of loss of kegs i.e. kegs indicated as remaining in either the brewery or a use location for a period much longer than would be expected.

The system thus described has considerable utility in being embodied in a vehicle, and the rugged design of the reader and the design of the computer for receiving the readers lends to the particular utility in the described environment. The design and layout of the computer 24 can of course be varied.

Reference will now be made to the remaining figures which show in diagrammatic form the electronic parts of the system being the reader 40, the cab computer 24 and the main frame computer and cartridge combination.

As described, the system is useful for tracking beer kegs. As also described, aluminium beer kegs often are

of greater value than the beer inside them, and there is a brisk trade in the theft of such kegs, for the melting down and resale of the aluminium of which they are made.

Thus, it will be appreciated that the system in providing tracking of the whereabouts of beer kegs can be useful not only in monitoring sales of beers, but also in monitoring the progress of the kegs themselves.

The portable data processor computer 24 is shown in Figure 6 and it is conveniently referred to as a "cab computer" 24. This comprises a central processing unit 80, the alpha numeric keyboard 30, the visual display unit 32, and the printer 34. The program for the central processor unit (CPU) 80 is stored in an electrically erasable read only memory (E^2ROM) 82. The CPU 80 both receives data from and transmits data to the removable data cartridge 36, which also contains an E^2ROM. The cab computer 24 also has the pair of wells 26, 28 each containing an infra red optical reader and transmitter to couple with the optical reader and transmitter 76, 78 of the reader 40.

The cab computer 24 as described is located in the cab of a beer delivery vehicle, or dray. Conveniently, it may be positioned on or adjacent the dashboard of the vehicle, for access by the driver. Power for the cab computer 24 is taken from the battery of the dray. All memory of the cab computer 24 is non-volatile, to avoid the loss of data, in the absence of power.

The data cartridge 36 may be replaced by a program cartridge, which is of similar physical configuration, but is arranged to alter an existing program within the cab computer 24, or to enter a new program into the cab computer.

The optical bar code reader 40 of which the circuit is shown in Figure 5 is as described a rugged, fluid tight, hand-held device, which by the nature of the manner in which it is held can be compared to a gun.

The reader 40 has the capability of processing data, and is therefore "intelligent". Its circuit comprises a micro-processor 84, which is programmed by means of an electronically programmable read only memory (EPROM) 86. Data is processed by the micro-processor 84 in a battery backed random access memory (RAM) 88.

The optical reading unit 90 is arranged to reach the optical bar code 92, which is carried on each aluminium beer keg, and uniquely identifies that particular keg. Signals from the optical unit 90 are passed to a decode logic circuit 94, which decodes the signals into data, which is subsequently processed by the micro-processor 84.

The reader 40 has a limited visual display 96, and limited manual controls in the form of trigger 58.

When either reader 40 is placed in a respective socket 26, 28 of the cab computer 24 (which sockets 26, 28 are conveniently referred to as "infra red wells"), the cab computer 24 can communicate with the reader 40 by means of respective infra red communication links 74, 76; and the infra red sockets 26, 28. The rechargeable power supply 68, which receives energy from the battery of the dray vehicle, when the reader is positioned in its respective infra red well 26 or 28, is also shown in Fig. 5.

Thus, the cab computer 24 and the reader or reader 40 travel with the dray to any desired location. Although the cab computer 24 may be installed within the dray

cab in at least a semi-permanent manner, a similar portable data processing unit may be constructed for use in other situations, in such manner that it may be manually portable between different physical locations.

Each reader 40 is a self-contained self-powered unit, having no direct link with the cab computer 24, once removed from its infra red well 26 or 28.

Figure 7 illustrates a main frame computer station which, in contrast to the cab computer 24 and the readers 40, may be and preferably will be in a substantially permanent location, typically the brewery at which the kegs are filled. In Figure 7, there is shown a first, central computer station 100, at which there is provided a main frame computer 102. There is also shown a second, peripheral computer station 104, which may be one of a plurality of peripheral computer stations, all connected by a respective transmission line 106 and modem 108 to the main frame computer 102 at the central computer station 100.

At the peripheral computer station 104, a desk top, personal computer 110 is connected to transmit data to and receive data from the main frame computer 102, via the modem 108. It is connected by an IEEE wiring system 112 to a data cartridge processor 114, which receives the removable data cartridge 36, as used in the cab computer 24. The data cartridge 36 may be replaced by a similar program cartridge, as outlined above.

The illustrated data collection system may be better understood, with reference to one example of a mode of operation, which will now be described.

A more detailed description of one mode of operation can now be given. The main frame computer stores all

the information related to all kegs in the system, namely brewery, number, type and location. For each dray, a cartridge 36 is prepared as to number of kegs to be delivered, location type etc, and the cartridge at the beginning of the day is inserted in the cab computer 24. The two readers 40 are in position in the infra red wells 26, 28, being trickle charged under the control of the cab computer 24, from energy supplied by the dray battery.

The data may be loaded into the data cartridges 36 from the main frame computer 102 overnight. The data is transferred via the transmission line 106 and modem 108 to the personal computer 110, which formats the data to a file type suitable for the data cartridge 36. The data is then fed to the data cartridge processor 114, which verifies and accepts the data, and transfers it into the data cartridge 36 in a compact form.

The personal computer 110 allows the data received from the main frame computer 102 to be edited, if desired. In a smaller organisation, if there is no main frame computer 102, then data for entry into the data cartridge 36 may be compiled directly at the personal computer 110. The I.E.E.E. link 112 is used instead of an RS232 link to facilitate rapid transmission of data.

The data that is transferred into each data cartridge 36 contains information for the delivery round of a drayman. Such information will include:

1. The physical location at which deliveries of new stock and/or collections of unused stock or returned containers, are to be made;

2. Details of the new stock ordered for each physical location, in terms of both quantity and type of stock;

3. The full order number for each delivery to be made and the full account number of each customer at each location; and

4. The date of the scheduled delivery round.

As the data cartridge is loaded with data from the data cartridge processor 114, there is printed out a schedule of all of the details that the drayman will require, for the delivery round pertaining to the particular data cartridge 36. The various data cartridges 36 that are loaded with data overnight may be placed in pigeonholes, together with the printed schedules, for collection by the draymen during the following working day.

Having collected a particular data cartridge 36 and its respective printed schedule, the drayman inserts the data cartridge 36 into his cab computer 24. This causes the cab computer 24 to switch on automatically, and to carry out a self-test routine. The cab computer 24 then goes on to check that the data cartridge 36 is not corrupt, that it is not empty, that it has not been used before, and that it is not a "program" cartridge.

If all is in order, the cab computer 24 then goes on to test the readers 40. Prompted by messages displayed on the display 32 of the cab computer 24, the drayman is asked to remove each reader in turn, read a bar code which may be a standard bar code located on or adjacent the computer 24, and replace the reader 40 in its respective well 26, 28, whereby the cab computer 24 can carry out its tests on the readers.

When the equipment has been satisfactorily tested, the drayman loads up his dray from his printed schedule. (He could alternatively load up his dray from prompts

on the display 32 of the cab computer 1, but this may be physically less convenient, and loses the opertunity of a later cross-check between what has been loaded from the printed schedule, and the corresponding information that should be present in the data cartridge 36).

Subsequently, the cab computer 24 asks the drayman to enter the load number. The drayman enters this via the keyboard 30, from his printed schedule. The computer then carries out a check to ensure that the data cartridge 36 matches up with the entered number, and displays a corresponding message, either to say that the check is satisfactory, or that the wrong cartridge has been inserted.

The computer then displays the date and time, and asks the drayman to check this. The drayman can change the date and time via the keyboard 30.

The drayman is then asked to enter his unique drayman number, which he does via the keyboard 30, and this is then stored on the data cartridge 36.

Following this, the computer displays a menu - for example, it may offer the drayman a choice of either "drop selection" or "end run".

Typically, the drayman will firstly choose "drop selection", which lists his drops (that is, his delivery and/or collection locations). The cab computer 24 lists the drops in a predetermined order on the display 32, but the drayman may step through the various drops, and select which drop he wishes to make next.

When the drayman arrives at this first drop location,

he makes an entry via the keyboard 30 to indicate that he is about to start his delivery/collection, and keys in information to indicate the particular drop location. He removes one of the readers 40 from its infra red well 26, 28 - the second gun may be used simultaneously by an assistant, whose unique number may previously have been entered in the cab computer 24.

For each beer keg that he removes from his dray, the drayman scans the respective bar code by means of his gun, which gives an indication on its display 96, and emits an audible bleep and area 58 lights up, when the bar code is read successfully. As each beer keg has its own unique bar code, there is stored in the reader 40 a record of each beer keg that is delivered.

The manual trigger 58 of the reader 40 is for causing the micro-processor 86 to alternate between "delivery" and "return" modes. For example, by depressing trigger 58 (or touching a touch-sensitive control in an alternative arrangement), the micro-processor 86 may cycle between the delivery and return modes, which are indicated by the respective l.e.d.'s 58 to 66 mounted in the housing of the reader 40. Upon releasing the trigger 58, the micro-processor 86 remains in the currently selected mode, which is confirmed by the respective l.e.d. If desired, the reader 40 may return automatically to "deliver" mode after a predetermined period of time, and/or may automatically be returned to "deliver" mode when placed in the infra red well 26, 28 of the cab computer 24.

If the drayman has to collect a returned beer keg, then he places his reader 40 into "return" mode, and subsequently reads the optical bar code of the keg. Thus, the reader 40 stores the unique details, not only of every delivered keg, but of every collected keg.

When the drayman has finished his drop (delivery and/or collection), he replaces his reader(s) 40 in the well(s) 26, 28 and the cab computer 24 prompts him to enter, via the keyboard, whether he has finished his drop. When the drayman responds in the affirmative, the cab computer 24 reads all of the data from the readers in the well 26, 28 checks it with the data that it expects from the data cartridge 36, and displays to the drayman any apparent errors. The drayman then has the choice either of continuing with his drop, to correct any unintentional errors, or to accept any apparent errors (e.g., because of a change of mind by the customer).

When the drayman eventually confirms that the drop has been completed, and accepts any apparent errors, he indicates this to the computer 24 via the keyboard 30. The computer 24 then produces a printed record of the complete transaction at the particular drop, and writes all of the information into the data cartridge 36.

The information printed by the printer 34 is in duplicate, and the customer at the drop is asked to sign this, as proof of receipt.

When the drayman has completed his drop, he selects his next drop from the choice displayed by the cab computer 24, and repeats the operation just described.

When he has completed his last drop (or earlier if he so chooses), the drayman indicates to the cab computer 24, via the keyboard 30, that he has come to the "end of run". At the end of the run, the drayman is given a receipt of the dray contents, which gives a record of all non-deliveries and returns, all of which information is stored on the data cartridge 36, such that the drayman cannot erase it.

The drayman returns to his base, and hands the receipt of the contents of his dray to a checker, who verifies the dray contents. The data cartridge 36 is removed from the cab computer 24 and handed to a supervisor, who loads it into the data cartridge processor 114. The information from the data cartridge 7 is then displayed on the personal computer 110, where an operator can carry out an intermediate check. The data is then transmitted via the modem 108 and transmission line 106 to the main frame computer 102 (or this can be done later, overnight).

For his next delivery round, the drayman picks up a fresh data cartridge 36 and printed schedule, and repeats the above described operation.

Thus, it will be appreciated that the illustrated data collection system provides a simple and reliable means of keeping track not only of delivery of the kegs and beer, but also of return of kegs. In the particular example described above, details may be held on the main frame computer 102 of the expected physical location of every beer keg that has been delivered to a customer. Thus, a careful and continuous check can be kept of the locations of such beer kegs, and any unusual trends in their progress may be noted. Due to the present way in which beer kegs are handled, delivered and collected, it is virtually impossible to keep an accurate track on progress of beer kegs, and annual losses of millions of pounds are encountered, in the U.K. alone.

A particular feature of the illustrated system is that the data is handled in a particularly secure manner, despite the simplicity of use. The reader 40 has a reasonable amount of intelligence, and is able not only to discriminate between delivered and returned kegs,

but also to verify whether a read bar code is of an expected type. Data from read bar codes is held in each reader 40, and not erased therefrom, until it has been safely received in the cab computer 24, and/or safely written to the data cartridge 36.

Each reader 40 preferably has means for providing a visual display to indicate when the rechargeable power supply 68 is at a low state. However, even when a low battery indication is given, the arrangement is such that the reader 40 will typically have up to a full day's further operational life.

Since the readers 40 can discriminate between different types of bar code, it is possible in an alternative arrangement to provide each beer keg with two separate bar codes - one for use when delivering the keg, and one for use when returning it. In such an arrangement, it will be appreciated that it is not essential to provide each reader 40 with manual means for changing between "deliver" and "return" modes.

As indicated above, both the cab computer 24 and each reader 40 may be re-programmed, in situ. To this end, the central and/or peripheral computer station 100, 104 may be used to enter a program into a program cartridge, via the cartridge processor 114, the program cartridge taking the place of the data cartridge 36. Upon receiving such a cartridge, the cab computer 24 identifies it as a program cartridge, and displays a prompt on the display 32, requesting verification that re-programming is to take place. Such verification can be entered either by the drayman or a supervisor, and may require appropriate identification codes to be entered via the keyboard 30, before re-programming can take place. The re-programming may affect the cab computer 24 itself. Alternatively or additionally, re-

programming of the readers 40 may take place, via the optical communication links between the computer 24 and the readers 40.

It will be appreciated that, in use of the illustrated system, the readers 40 and cab computer 24 may be used for an indefinite period, without the need to return to base, provided that the drayman has a sufficient number of data cartridges 36.

As an alternative to the E^2ROM that is employed in each data (or program) cartridge 36, there may be employed a battery backed RAM.

Although the illustrated data collection system has been described with reference to the delivery of beer in aluminium kegs, it will be appreciated that the system may be adapted to various other uses.

The system of the embodiment of the invention described provides a solution to the problem of loss of beer kegs. As to the extent of the loss which normally takes place in relation to these kegs, estimates vary but the loss exceeds £10,000,000 (sterling) per annum. The kegs are desirable because of their high scrap value, and heretofore the brewing industry has not been able to track the kegs whilst in service. To give some indication of the utilisation of these kegs, one particular brewery has in the order of 1,000,000 in circulation at any one time. Each keg makes on average twelve round trips i.e. from brewery to customer and back per year. At the same brewery the keg may be filled in any one of four production sites, and delivered either directly or indirectly through an agent to any one of over 12,000 customers.

The system according to the present invention provides

tight control over each keg, and other general advantages of the system are that the number of personnel required for the distribution of the kegs and the cab mounted computer and the readers are of robust construction so as to be able to function well in the difficult environment. By providing two bar code readers the time required for scanning of bar codes can be reduced as each member of a two man crew can use one of the readers independently of the other. The readers communicate with the cab computer without requiring the transferral of the readers to the main frame computer management system. The specific form of reader is of a convenient size and can be located in the drayman's pocket when not in use, and therefore will not restrict the drayman in any way in performing other functions such as loading and unloading kegs to and from the vehicle.

As the cab computer is a full micro-computer, possible expansion of the system will provide for the collection of market research data, the printing of invoices at delivery points and electronic transfer of funds initiation. As regards the readers, their use is quite flexible and where a two man crew is involved, each man can read all the kegs, or one can read the full kegs while the other reads the empty kegs, or indeed any method of operation can be chosen as the readers are usable independently. If one reader brakes, the second reader provides insurance to enable the drayman to carry out his work.

The main frame computer can be arranged and programmed as required, to provide a management reporting function, and typical of the management reporting which may be performed includes any one or more of the following: customer sales, stock details, overdue containers (by location, size, product), container

history (production and trade cycle details), supplier anomolies (kegs supplied to/collected and returned from another), collection anomolies (kegs supplied to/collected and returned from another), stock check anomolies, trend analysis and generalised enquiry. The management system can be arranged to print out any information as required but generally speaking it can be used in a paper list fashion.

The specific design of reader as described herein has a further advantage that it can survive a 4.5 m drop onto the ground, and it will not be squashed or damaged by one of the kegs when full rolling over the reader. There are no connecting wires or trailing leads between the reader and the computer.

The data cartridge which is plugged into the cab computer is an audio cassette-like device of robust construction.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification and/or drawings, or to any novel one, or any novel combination, of the steps of any method or process disclosed herein.

CLAIMS

1. A system for monitoring or tracking coded articles which in use are moved from location to location, comprising:

a) a manned vehicle for moving the articles from location to location;

b) a data processor programmed to handle data representative of the codes of said articles, said processor being mounted on the vehicle so as to be accessible for manual operation;

c) at least one reader device holder associated with said processor;

d) at least one portable reader device by which the codes on said articles can be read, said reader device being usable remotely from the data processor so as to store data representative of said codes of said articles, and being adapted to be positioned in the holder; and

e) means coupling the reader device and said processor when the reader device is in the holder enabling the downloading of the data from the reader device to the processor.

2. A system according to Claim 1, wherein said reader device comprises a reading head adapted to read bar coding, said articles being bar coded.

3. A system according to Claim 1 or 2, wherein said means coupling comprises a coupling head on the reader device, said coupling head being located spaced from said reading head.

4. A system according to Claim 3, wherein said coupling head is an infra red coupling head.

5. A system according to Claim 2, 3 or 4, wherein said

reader device is in the nature of a gun defining a handle portion to be gripped by the hand, and a nose portion.

6. A system according to Claim 5, when taken with Claim 2, wherein said reading head is located in said nose portion.

7. A system according to any of Claims 2 to 6, wherein said reader device comprises a casing housing the device electronics and battery means by which the reader device electronics are driven.

8. A system according to Claim 7, when taken with Claim 5 or 6, wherein the extremity of the nose portion and the end of the handle portion are defined by resilient, shock resistant material.

9. A system according to Claim 7 or 8, wherein the casing comprises two robust injection moulded parts which are received by screws.

10. A system according to any preceding claim, wherein the reader device has electrical contacts which automatically contact power supply contacts in said holder when the reader device is placed therein whereby a battery means in the reader device is charged from the data processor.

11. A system according to any preceding claim, wherein the data processor is driven from the electrical circuit of the vehicle.

12. A system according to any preceding claim, wherein the data processor is contained in a housing fixed in the driver's cabin of the delivery vehicle.

13. A system according to Claim 12, wherein said housing has a lockable lid which, when locked, prohibits access to and operation of said data processor.

14. A system according to any of the preceding claims, wherein the data processor comprises a visual display unit (VDU) a printer and keyboard.

15. A system according to any one of the preceding claims, wherein there are two of said reader devices and two of said holders.

16. A system according to Claim 5, or any claim dependent thereon, wherein said holder or each said holder comprises a well into which the handle portion of the or each reader device fits.

17. A system according to Claim 3 or 4, or any claim dependent thereon, wherein the said coupling head is provided on the reader device handle portion.

18. A system according to Claim 10, or any claim dependent thereon, wherein the said electrical contacts are provided on said handle portion.

19. A system according to any preceding claim, wherein the or each reader device is capable of operating in either of two modes namely a delivery mode which is used when delivering articles to a location, and a collection mode which is used when collecting articles from a location, said rader device further having a control means for moving the reader device between modes.

20. A system according to Claim 20, wherein said control means comprising a trigger switch located so as

to be actuable in the nature of a trigger by the forefinger when the reader device is held in the hand in operative manner.

21. A system according to any preceding claim, wherein the data processor is adapted to receive a portable data medium unit in a part thereof for the programming of the data processor and for receiving data from the data processor.

22. A system according to Claim 21, wherein the data processor is adapted to receive a portable data medium cartridge.

23. A system according to Claim 22 or 23 including a said data medium unit.

24. A system according to Claim 23, in combination with a main frame computer located at a fixed, control location, said main frame computer being adapted to receive said data medium unit for the programming of same and for receiving data from same, said main frame computer being programmed to analyse data from said readers which has been downloaded to the data processor and processed thereby and then downloaded to the portable data medium unit and eventually downloaded to the main frame computer, if appropriate by comparison with data already stored in the main frame computer.

25. A reader for use in a system as aforesaid, and in the second aspect, there is provided a reader device for use in a system for monitoring coded articles, said device being portable and comprising a reading head for reading codes on the articles, means for storing data representative of said codes, and a coupling head by which said stored data may be downloaded with a data processor, said coupling head being spaced relative to

the reading head.

26. A reader device according to Claim 25, wherein said coupling head is an infra red coupling device.

27. A reader device according to Claim 25 or 26, wherein said reading head is adapted to read bar codes.

28. A reader device according to Claim 25, 26 or 27, wherein the device is in the nature of a gun defining a handle portion to be gripped by the hand and a nose portion.

29. A reader device according to Claim 28, wherein the reading head is in the nose portion and the coupling head is in the handle portion.

30. A reader device according to any of Claims 25 to 29, comprising a casing housing the device electronics and battery means by which the electronics are driven.

31. A reader device according to Claim 30, wherein said casing comprises two robust injection moulded parts which are screwed together.

32. A reader device according to Claim 28, or any claim dependent thereon, wherein the extremity of the nose portion and the end of the handle portion are defined by resilient, shock resistant material.

33. A reader device according to any of Claims 25 to 32, wherein the device electronics are powered by a battery and the device has electrical contacts enabling the charging of the battery by insertion of the reader device in a socket having power supply contacts.

34. A data collection system comprising a hand-held

data reader adapted to read and store successive items of data; and a portable data processor unit adapted to receive successive items of data from the data reader, process said items of data, and store said items of data on a portable data storage medium.

35. A hand-held data reader comprising a housing; data reading means mounted in the housing and adapted to read an external data medium; a non-volatile memory; a communications port adapted for the transmission of data from said memory to an external device; and data processing means adapted to receive data from the data reading means, transmit the data to said memory, and transmit data from said memory to said port; said housing being substantially fluid type.

36. A data processing system comprising a computer and a plurality of data collection units remote from the computer, the computer being arranged to receive from the data collection units data indicative of the identity and physical location of each of a plurality of articles, and to so process the data as to provide an indication of the present physical location of each of said articles, at any given time.

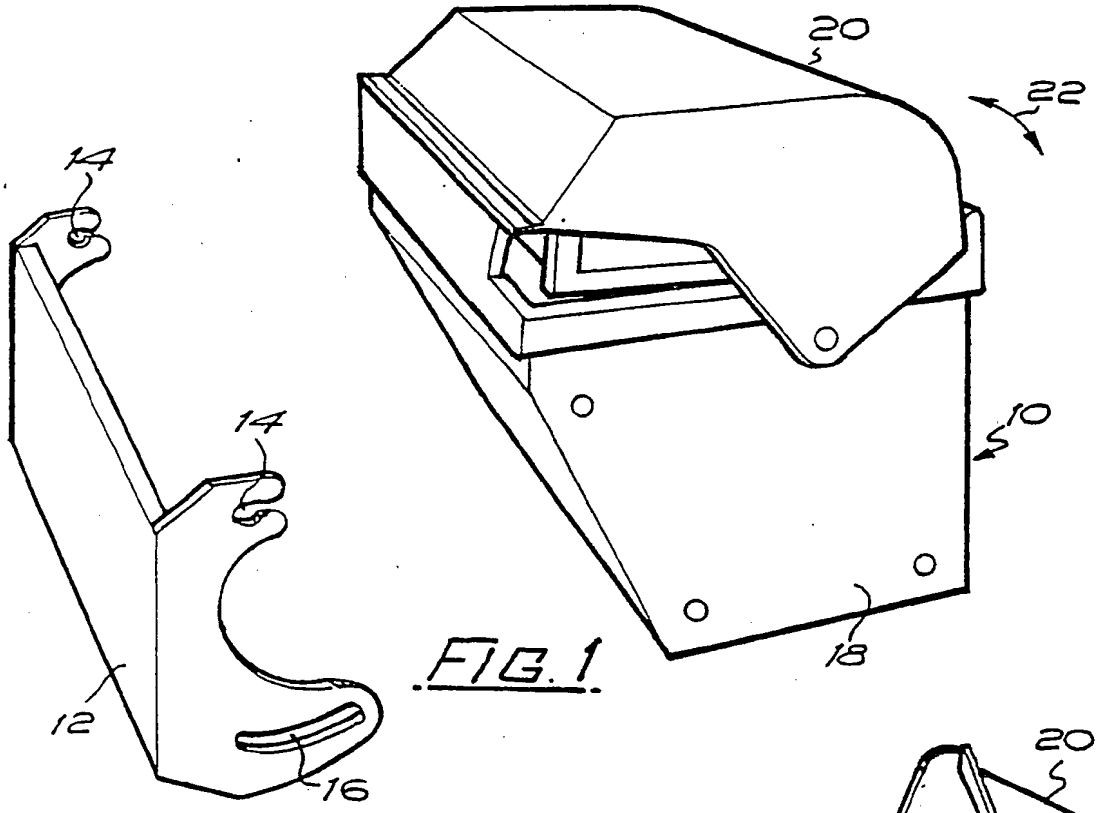

FIG. 1

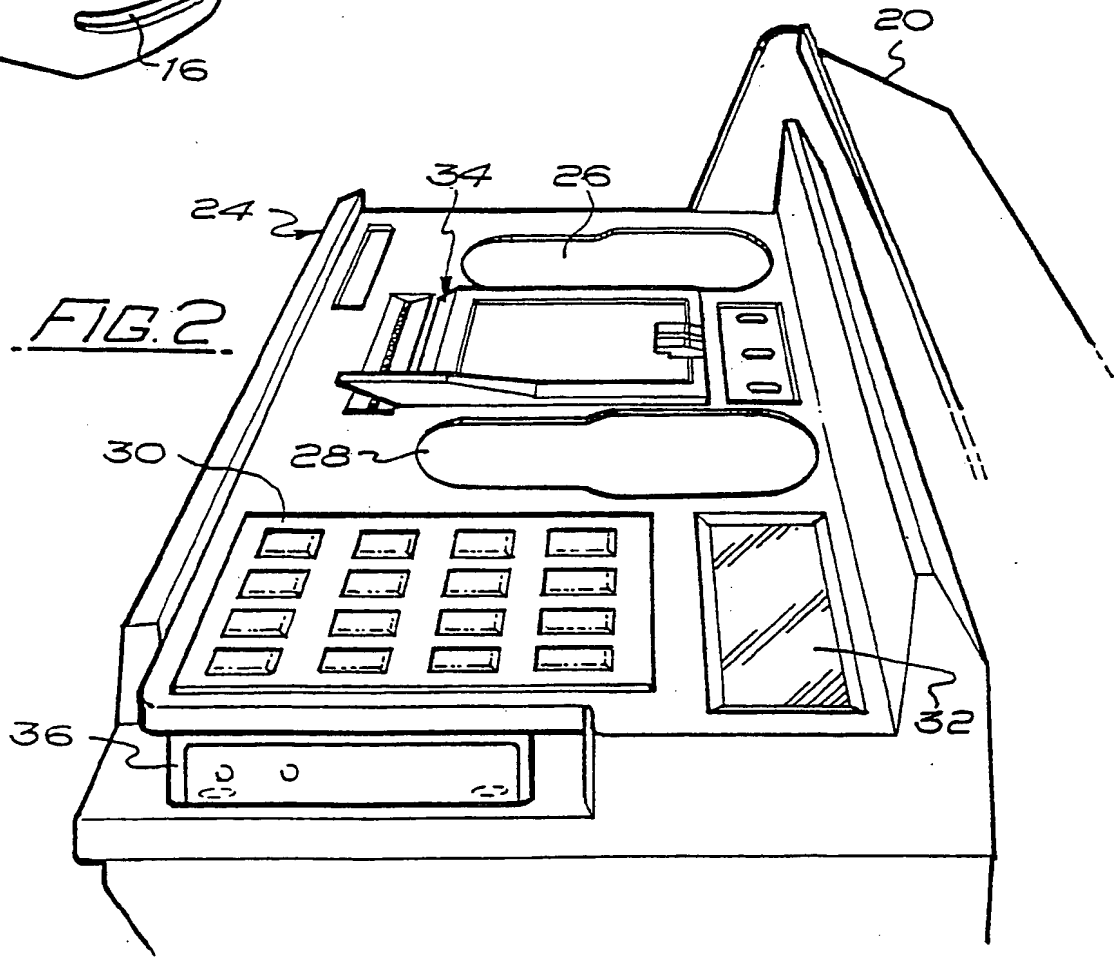

FIG. 2

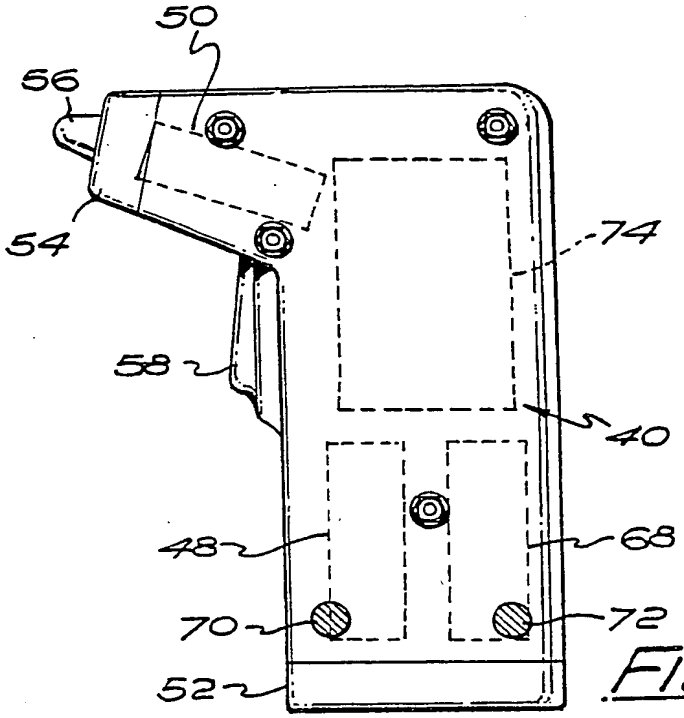

FIG. 3

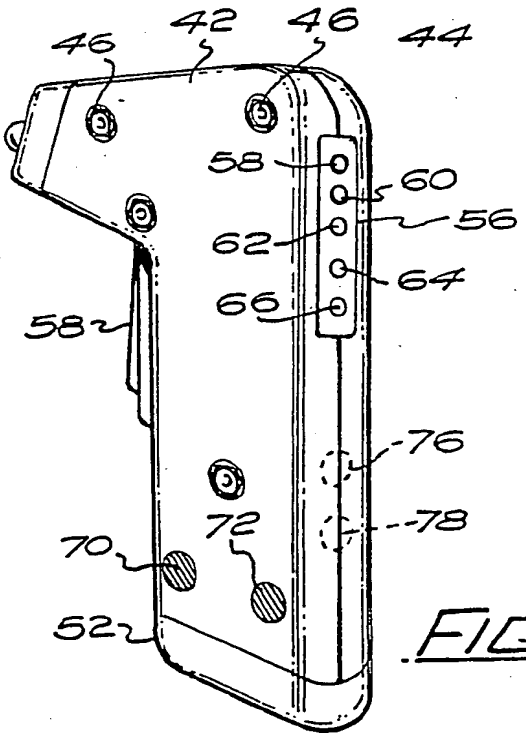

FIG. 4

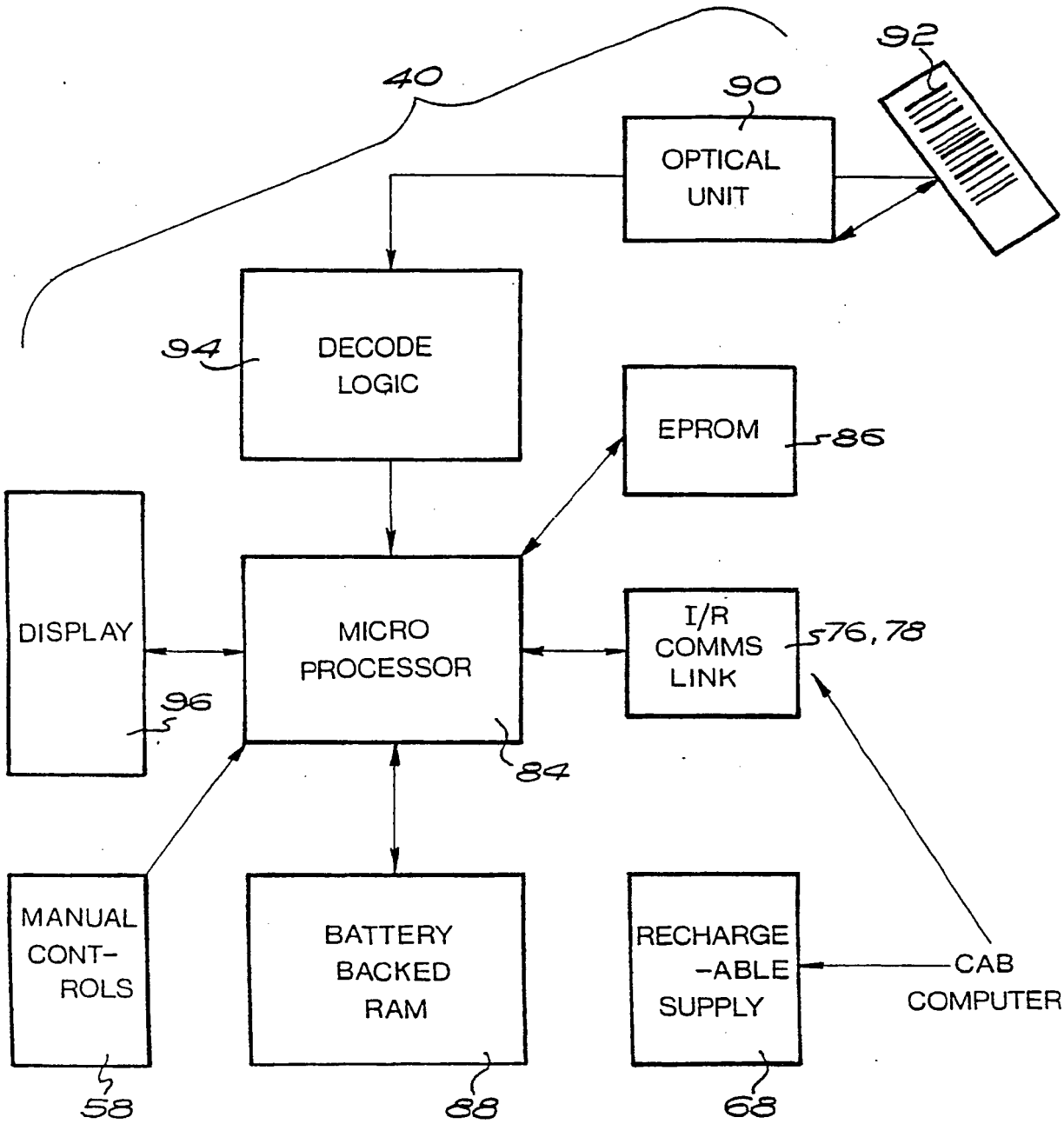

FIG. 5

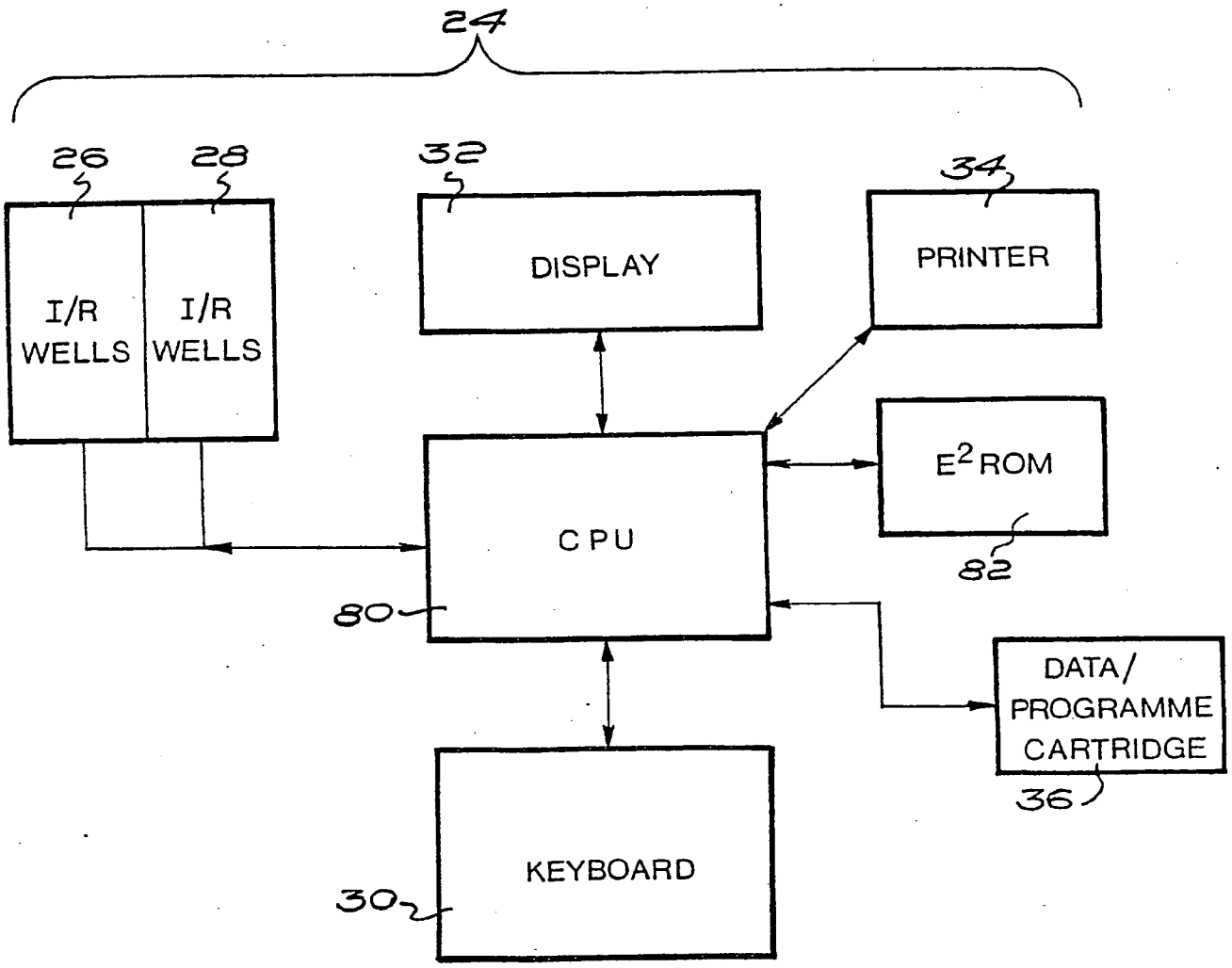

FIG. 6

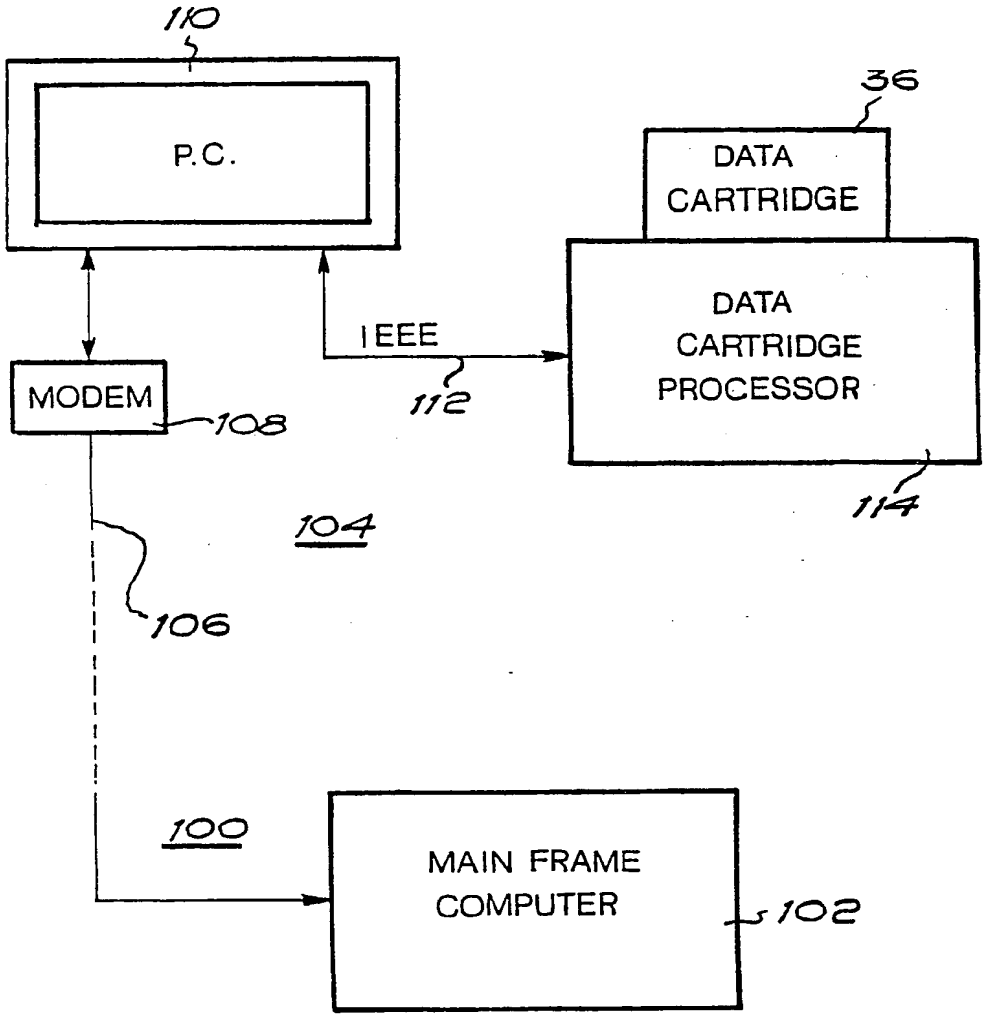

FIG. 7

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 88/00907

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC4: G 06 F 15/24, G 06 K 17/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC4	G 06 F, G 06 K

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	Patent Abstracts of Japan, Vol 9, No 246, P393, abstract of JP 60- 97467, publ 1985-05-31 HOKUSAN KK --	1-36
Y	Patent Abstracts of Japan, Vol 9, No 44, P337, abstract of JP 59-184967, publ 1984-10-20 NIPPON DENKI KK --	1-36
Y	EP, A, 0151533 (J G BAILEY) 14 August 1985, see page 1, line 1 - line 32; abstract --	1-36
Y	US, A, 4418277 (H TREMMEL AND H BERNOT) 29 November 1983, see the whole document --	1-36

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26th January 1989	23 FEB 1989
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	P.C.G. VAN DER PUTTEN

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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Y	US, A, 4345147 (R L AARON AND E F MURPHY) 17 August 1982, see the whole document --	1-36
Y	US, A, 4387297 (J SWARTZ ET AL) 7 June 1983, see the whole document --	1-36
Y	US, A, 4423319 (H JACOBSEN) 27 December 1983, see the whole document --	1-36
A	US, A, 4465926 (S APITZ AND R NONNENMANN) 14 August 1984, see the whole document --	1-36
A	US, A, 4101072 (D J WEAVER ET AL) 18 July 1978, see the whole document --	1-36
A	US, A, 4373133 (N CLYNE ET AL) 8 February 1983, see the whole document --	1-36
A	US, A, 4193540 (R DOUGADOS ET AL) 18 March 1980, see the whole document --	1-36
A	WO, A1, 85/00680 (IMPULSE COMPUTER SYSTEMS INC) 14 February 1985, see abstract --	1-36
Y	IBM TECHNICAL DISCLOSURE BULLETIN, Vol. 19, No. 5, October 1976 (NEW YORK, USA) P C FUROIS, L F GIACCONE: "PORTABLE INVENTORY SYSTEM AND METHOD", see page 1828 --	1-36

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. PCT/GB 88/00907

SA 24936

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 12/01/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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SA 24936

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